

Claims

- [c1] An electrical power circuit assembly, apparatus and method comprising;
- an insulated metal substrate (IMS) printed circuit board (PCB) assembly, designated IMS PCB, further comprising a metal substrate, one or more electrically insulating layers, one or more electrically conductive circuit foil layers and a plurality of semiconductor power devices soldered to said conductive circuit foil layers,
 - a second PCB assembly, designated filter PCB, further comprising, one or more electrically non-conductive board layers, one or more electrically conductive circuit foil layers and one or more capacitors, one or more, electrically conductive bus bars located between said IMS PCB and said filter PCB, where the bus bar minor dimension is between said PCBs and the major dimension runs perpendicular to the electrical current flow in the said semiconductor power devices or where any other bus bar geometry is used that substantially serves to minimize the inductance between said semiconductor power devices on the IMS PCB and said capacitors on the filter PCB,
 - a rigid heatsink or a heat removal surface,
 - a clamping mechanism
- [c2] An electrical power circuit assembly according to Claim 1 where the clamping pressure from said clamping mechanism creates electrical contact between at least one circuit foil, on said PCB circuit foil layers, and at least one bus bar.
- [c3] An electrical power circuit assembly according to Claim 1 further comprising hardware that clamps said filter PCB through said bus bars through said IMS

PCB to said heatsink where the bus bar or bars are used to uniformly spread this clamping pressure through the IMS PCB to the heatsink at all locations substantially under the bus bar footprint or footprints.

- [c4] An electrical power circuit assembly according to Claim 1 where one or more said electrically conductive bus bar carries or bus bars carry current between the entire electrical power circuit assembly and external sources and/or loads.
- [c5] An electrical power circuit assembly according to Claim 1 where the conductive IMS substrate is used as an active current carrying component.
- [c6] An electrical power circuit assembly according to Claim 1 where some of said power semiconductor devices are soldered, fastened or clamped to the IMS metal substrate as opposed to all devices being soldered to the IMS conductive foil layers.
- [c7] An electrical power circuit assembly according to Claim 1 where some of said power semiconductor devices are soldered, fastened or clamped to the IMS conductive foil layers as opposed to all devices being soldered.
- [c8] An electrical power circuit assembly according to Claim 1 where the power semiconductor circuit arrangement on the IMS PCB is not limited to, but may be; a half-bridge, full-bridge, 3-phase bridge, all with either a mono-polar DC bus or a bipolar DC bus arrangement.
- [c9] An electrical power circuit assembly according to Claim 1 where the power semiconductor devices used on the IMS PCB may be, but are not limited to, field effect transistors, insulated gate bipolar transistors, rectifiers, bipolar transistors or any mix thereof.
- [c10] An electrical power circuit assembly according to Claim 1 where the filter PCB is a multi layer PCB or other laminated bus structure which uses buried layers

as planes for the DC bus potentials.

- [c11] An electrical power circuit assembly according to Claim 1 where the capacitors on the filter PCB are either connected across a mono-polar DC bus circuit or two sets of capacitors are connected from two DC poles to a common DC bus potential in a bi-polar DC bus circuit arrangement.